Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Establishment of an Improved Model for Predicting the Broadcast Television Field Strength Received at Individual Locations	)	ET Docket No. 00-11

COMMENTS OF DIRECTV, INC.

DIRECTV, Inc. ("DIRECTV")[1] hereby submits the following comments in response to the Commission's Notice of Proposed Rulemaking ("Notice") in the above-captioned proceeding.

I. INTRODUCTION & SUMMARY

In enacting the Satellite Home Viewer Improvement Act of 1999[2] ("SHVIA"), Congress added new Section 339(c)(3) to the Communications Act of 1934, which requires the Commission, within 180 days of the SHVIA's passage, to "take all actions necessary, including any reconsideration, to develop and prescribe by rule a point-to-point predictive model for reliably and presumptively determining the ability of individual locations to receive signals in accordance with the signal intensity standard in effect under" the satellite carrier compulsory license provisions of the Copyright Act.[3] In so doing, Congress has directed the Commission (i) to rely upon its already-developed Individual Location Longley-Rice ("ILLR") model,[4] (ii) to

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1 DIRECTV is a wholly-owned subsidiary of DIRECTV Enterprises, Inc., a licensee in the DBS service and a wholly-owned subsidiary of Hughes Electronics Corporation.

2 Act of Nov. 29, 1999, Pub. L. No. 106-113, §1000(9), 113 Stat. 1501 (enacting S. 1948, including the Satellite Home Viewer Improvement Act of 1999, Title I of the Intellectual Property and Communications Omnibus Reform Act of 1999, relating to copyright licensing and carriage of broadcast signals by satellite carriers, codified in scattered sections of 17 and 47 U.S.C.).

3 SHVIA, Section 1008; *see* 17 U.S.C. § 119(d)(10)(A).

4 The ILLR Model is a version of Longley-Rice 1.2.2 endorsed by the Commission for predicting signal strength at individual locations. *See* Satellite Delivery of Network

ensure that the model takes into account terrain, building structures, and other land cover variations, and (iii) to establish procedures for the continued refinement of the model by the use of additional data as it becomes available.[5] In accordance with Congress' mandate, the Commission has proposed to define an improved model for predicting the field strength produced by a television network affiliate station at individual locations, using its current ILLR model as a guide, which will be incorporated into its rules.[6]

In its comments below, DIRECTV first offers its initial technical observations on the Commission's suggested improvements to the ILLR model. While the Commission is on the right track generally in implementing ILLR improvements, the Commission has not adequately integrated its proposed clutter loss values into the ILLR model, and should improve its proposal in this regard. DIRECTV also supports the Commission's proposal to use a rulemaking type procedure (an expedited one) to continue refining and upgrading the ILLR model. DIRECTV concludes by proposing that a joint working group be formed by representatives of the trade associations of each of the broadcasting and satellite industries, which would then be responsible for identifying, if possible, one or more qualified consulting engineers in each Designated Market Area ("DMA") in the United States, who in turn could be called upon to settle particular testing disputes in the relevant DMA

Signals to Unserved Households for Purposes of the Satellite Home Viewer Act; Part 73 Definition and Measurement of Signals of Grade B Intensity, 14 FCC Rcd 2654 (1999).

5 SHVIA, Section 1008 (creating new Section 339(c)(3) of the Communications Act of 1934, 47 U.S.C. § 339(c)(3)).

6 *Notice* at ¶ 6.

II. IMPROVEMENTS TO THE ILLR MODEL

A. The Commission Should Add Clutter Loss Parameters And Adapt Land Use and Land Clutter Categories As Proposed

The Commission first proposes to improve the ILLR model by adding to it clutter loss parameters.[7] Specifically, the Commission proposes to classify reception point environments according to the codes used in the Land Use and Land Cover ("LULC") database of the United States Geological Survey ("USGS"), and to add clutter loss values to the radio propagation loss predicted by the Commission's basic Longley-Rice 1.2.2 methodology. To simplify the use of the database for ILLR purposes, the Commission has reorganized the LULC categories in a manner that is specifically relevant to radio propagation, ultimately identifying 10 environmental classes to applied to individual household reception points.[8]

DIRECTV supports the Commission's proposal to use USGS LULC categories in conjunction with the ILLR program. The USGS LULC database is a source of credible, verifiable information regarding vegetation, water, natural surface and other features on the land surface, and is widely relied upon by the scientific and technical communities for a variety of applications. However, as the Commission recognizes, many of the current LULC categories have little relevance or are too detailed for television signal prediction algorithms. Thus, the Commission appropriately has distilled and reclassified the 37 original USGS categories of raw

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7 Clutter loss "includes the effects of both vegetation and buildings and is dependent upon the environment of the individual household reception point." *Id.* at ¶ 9.

8 *Id.* at ¶ 10; *see id.*, Appendix A, at A-4, Table 2. The Commission correctly observes that its proposed simplification is the same as the classification system currently under consideration by the Telecommunications Industry Association. *See id.* & n.11.

data into ten data categories that are far more relevant to signal propagation.[9] Those categories should be incorporated into the ILLR model as the Commission has proposed.

B. The Commission Has Defined Adequate Clutter Loss Values, But Has Radically And Unnecessarily Limited The Situations In Which Clutter Loss May Be Taken Into Account

DIRECTV also supports the Commission's proposed clutter loss values,[10] which will be associated with each and every LULC category. However, the Commission appears to have made a grievous error in proposing that clutter losses be ignored in the ILLR algorithm if the household under study is in a "shadowed location," as defined by a specific Fresnel clearance factor.[11] In this regard, the Commission appears to have misinterpreted a study by Thomas N. Rubinstein that forms the basis of the proposed ILLR table of clutter loss values.[12] Because Rubinstein values of clutter loss "are derived exclusively from measurements made at receiver sites with Fresnel clearance," the Commission proposes that "the values should apply only in matching situations," even though it expressly acknowledges that such an approach will greatly limit the number of situations in which clutter loss will be taken into account, and effectively will mean that LULC data will not be used in a very large number of scenarios.[13]

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9 DIRECTV in fact proposed this precise simplification and incorporation of LULC categories into the ILLR model last year. *See* Reply of DIRECTV, Inc., CS Docket No. 98-201 (April 26, 1999), at 4 & Exhibit 1, Engineering Statement of Hatfield and Dawson at 3-5.

10 *See Notice* at ¶ 11 & Appendix A, A-6, Table 3.

11 *See id.* at ¶ 11 & n.13 ("The receiver is considered to be in a shadowed location if a terrain elevation point along the path extends 0.6 of the way into the first Fresnel zone.").

12 *Id.* at ¶ 11 & n.12 (*citing* Thomas N. Rubinstein, "Clutter Losses and Environmental Notice Characteristics Associated with Various LULC Categories," IEEE Transactions on Broadcasting, Vol. 44, No. 3 (Sept. 1998)).

13 *Id.* at ¶ 11.

In the study cited by the Commission, Rubinstein avoided measuring shadowed locations in order to avoid problems associated with the Okumura propagation prediction method that Rubinstein used to process his data. Once processed, Rubinstein placed no limitations on the applicability of his results; Rubinstein's values of local clutter loss apply to *all* locations, both shadowed and line-of-sight, with few exceptions. Thus, it simply does not follow that the Commission should ignore Rubinstein's clutter loss results for shadowed locations, as the *Notice* suggests.[14]

In fact, the shadowing of a household, and the additional signal loss caused by clutter near the household, are unrelated except for extraordinary circumstances. Clutter loss is the loss produced by vegetation and buildings or other artifacts of urbanization in the immediate foreground of an antenna. It is unrelated to the loss caused by diffraction effects elsewhere on the path. Very few paths at UHF and VHF frequencies will have 0.6 first Fresnel zone clearance in the immediate foreground of a receiving antenna elevated less than 9 meters above ground, and so the effects of clutter in the area are critical to path loss, but are separate and distinct from any obstructions that extend into the first Fresnel zone elsewhere on the path.[15]

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[14] Indeed, the only possible case where clutter loss may be ignored would involve locations that are severely shadowed by close-in obstructions that raise the vertical angle of the arriving signal path to well above local clutter. However, under those circumstances, the Longley-Rice algorithm will usually report an error and the household will be considered "unserved" for Copyright Act purposes. *See id.* at Appendix A, A-1, bullet 6 (noting that "where error codes indicate a severe error, the field strength is deemed inadequate for TV service"). It should be noted that Rubinstein used elevated mountaintop transmitter locations for many of his measured paths, and some of those paths included steep angles of arrival. Rubinstein made no attempt to segregate the steep-angle paths from his other measurements.

[15] As an example, this kind of situation is outlined well in a discussion of path loss algorithms in the documentation for the propagation analysis program "Pathloss." In the instruction manual for the program, this kind of situation is fully described. *See* Pathloss 4.0, Contract Telecommunications Engineering, 2007 Cape Horn Avenue, Coquitlam, BC V3K 1J2. The underlying analysis of the methodology for evaluating

Because clutter loss occurs regardless of whether the path is diffracted (*i.e.*, the household is shadowed), DIRECTV believes that it would be a grave mistake for the Commission to exclude clutter loss (that is, to set it to zero as the *Notice* proposes) simply because the path does not match the conditions under which Rubinstein's measurements were made. Indeed, in the context of adopting clutter loss values for low band VHF television, the Commission has appropriately applied frequency trend data to develop clutter loss values, without limiting the creation or application of those values only to situations where data have been analyzed and published for matching situations.[16] Such an approach can and should be adopted in the context of applying clutter loss values generally in the improved ILLR model.

Congress has expressly directed the Commission to "ensure" that the ILLR model takes into account terrain, building structures, and other land cover variations.[17] The Commission itself recognizes that its proposed approach here does no such thing, and in fact would greatly *limit* the number of scenarios in which clutter loss may be taken into account.[18] This limitation means that consumers who in fact receive a degraded or poor over-the-air broadcast signal due to clutter loss will be predicted by the ILLR model to enjoy clear reception such that they are not permitted to receive a distant network signal via satellite. Such a result is not in the public interest, not consistent with the Congressional directive, and is not consistent with the Commission's own stated goal of providing a model that "reliably and presumptively determine[s] whether over-the-air signals of network affiliated television stations can be received

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near-terminal clutter loss used by Pathloss and other programs is taken from "Some Effects of Buildings and Vegetation on VHF/UHF Propagation" by Phillip L. Rice (ITS, Boulder, IEEE 1971 Mountain-West Conference Record).

16 *Notice* at ¶ 12.

17 47 U.S.C. § 339(c)(3).

18 *Notice* at ¶ 11.

at individual locations."[19] The Commission should instead ensure that the ILLR model takes into account clutter loss in as many scenarios as possible.

C. The ILLR Model Should Include Fresnel Zone Losses

The Longley-Rice algorithm does not consider Fresnel zone shadowing except in extreme cases. Examination of the FORTRAN code listing and sample runs reveal that Longley-Rice does not consider Fresnel loss until an obstacle penetrates the direct path between transmitter and receiver.[20] Thus the Longley-Rice point-to-point predictive model, which is at the heart of the ILLR methodology, does not provide for the Fresnel zone clearance "trigger" proposed by the Commission for the determination of shadowed locations.

DIRECTV believes that the ILLR model should include the calculation of all Fresnel zone losses, including those for terrain obstacles that intrude into the Fresnel zone below the direct ray. This simple calculation should be included not as a trigger for clutter loss consideration, but instead as a refinement to the model.[21]

The addition of a complete Fresnel zone clearance calculation will reduce or eliminate the abrupt change in path loss that now occurs when the Longley-Rice program switches from line-of-site to trans-horizon mode. It will also allow the model to more accurately predict the actual increase in path loss that occurs when terrain obstacles begin to penetrate the Fresnel zone below the direct ray.[22] On the other hand, not accounting for Fresnel losses means that the ILLR

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19 *Id.* at ¶ 1.

20 *See* "Special Issue on Mobile Radio Propagation," IEEE Transactions on Vehicular Technology, Vol. 37, No. 1 (February 1988), at 31.

21 There are many examples of Fresnel integral approximation algorithms that are suitable for diffraction loss calculations. *See, e.g.,* FORTRAN listing, Hess, Gary C., "Handbook of Land-Mobile Radio System Coverage" (Artech House, 1998) 281, Appendix J.

22 *See* "Special Issue on Mobile Radio Propagation," IEEE Transactions on Vehicular Technology, Vol. 37, No. 1 (February 1988), at 29-31.

model will not be as accurate as it could be – again, meaning that consumers predicted by the model to receive clear signals in fact may suffer from degraded or poor over-the-air signal quality with no available alternative. In enacting the SHVIA and explicitly directing the Commission to improve the ILLR model, Congress did not intend such a result.

III. THE COMMISSION SHOULD ADOPT EXPEDITED INFORMAL RULEMAKING PROCEDURES FOR CONTINUED REFINEMENT OF THE ILLR MODEL

Because of the copyright law implications of the SHVIA, the Commission has proposed that future amendments to the ILLR model be effected through "formal rulemaking," based upon the filing of petitions for rulemaking supported by high-quality engineering studies.[23] The Commission correctly anticipates that industry efforts and the availability of higher quality data, such as the data being collected by Landsat satellites, may contribute to further improvements and refinements to the ILLR model.[24]

The use of notice-and-comment rulemaking procedures in the manner that the Commission suggests is appropriate, subject to two caveats.

First, the Commission should clarify that its reference to "formal rulemaking" in the *Notice* does not mean "formal" rulemaking under Sections 556 and 557 of the Administrative Procedure Act,[25] which is a trial-type procedure that is very rarely used by administrative agencies. Instead, the Commission appears to be proposing to use its standard notice-and-comment informal rulemaking authority under APA Section 553 to keep the ILLR model updated. DIRECTV believes that proceeding in this manner, with a proposed change to the

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23 *Notice* at ¶ 13.

24 *Id.* & n.15.

25 *See* 5 U.S.C. §§ 556-57.

ILLR model being initiated by a petition for rulemaking or similar vehicle, such as a petition for declaratory ruling,[26] is logical and should be adopted by the Commission.

Second, however, the Commission should recognize the need for expedition in making such determinations. Any rulemaking process adopted to effect change in the ILLR model should account for the fact that millions of satellite subscribers' receipt of distant network station signals will depend upon determinations that are made by applying the model to their specific households. Refinements to the ILLR model should be made quickly, without being subject to excessive administrative delay.

The procedures adopted to refine the ILLR model should include expedited time frames within which relevant petitions will be placed upon public notice and promptly acted upon by the Commission. DIRECTV proposes that such petitions be placed upon a 10-day/5-day comment and reply cycle, with an order acting upon proposed refinements to the ILLR model released by the Commission no later than 45 days from the time that a petition for rulemaking or declaratory ruling is filed.

IV. DESIGNATION OF A NEUTRAL AND INDEPENDENT ENTITY FOR TESTING PURPOSES

New section 339(c)(4)(B) of the Communications Act provides that if a satellite carrier and a network broadcast station or stations asserting that the retransmission of a distant signal is prohibited cannot agree on a person to conduct a signal test at a particular household, the person is to be designated by an independent and neutral entity designated by the Commission by rule.[27]

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26 *See* 47 C.F.R. § 1.2. For example, the Commission has proceeded to expand the different types of digital modulation formats permitted in the MDS service using a declaratory ruling approach. *See, e.g.,* In the Matter of Request for Declaratory Ruling on the Use of Orthogonal Frequency Division multiplexing Modulation By Multipoint Distribution Service and Instructional Television Fixed Service Stations, 14 FCC Rcd 4121 (1999).

27 47 U.S.C. § 339(c)(4)(B); *Notice* at ¶ 14.

DIRECTV believes that it is important for the Commission to implement this obligation in a manner that accounts for the needs of both the broadcasting and satellite industries, and that is not overly difficult to administer. Thus, DIRECTV proposes that the Commission appoint a working group comprised of representatives from the Satellite Broadcasting and Communications Association and the National Association of Broadcasters, which would then be responsible for identifying, if possible, one or more qualified consulting engineers in each DMA in the United States. If it is not possible to locate a qualified engineer in each DMA, then a regional consulting engineering firm could be recommended. In any event, such engineers or firms in turn would be called upon to settle particular testing disputes in the relevant DMA.

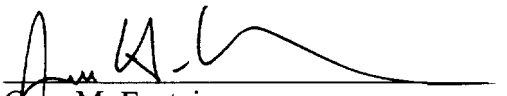
In addition, the Commission should include in its regulations a provision enabling test results, by agreement of the parties, to be extended to neighboring households, so as to "avoid any undue burden on any party" as required by Section 339(c)(4)(C). For example, where a satellite carrier and a broadcaster have agreed on the results of a test at a particular household, a satellite subscriber in a neighboring household should not be permitted to require a test if the broadcaster and satellite carrier have agreed that the test results apply to the neighbor's household as well. These latter parties are in the best position to conduct and evaluate test results, and DIRECTV strongly believes that consumers will be best served if the testing process is as streamlined and unobtrusive as possible.

V. CONCLUSION

It is extremely important that Commission fulfill Congress's mandate to develop an ILLR predictive model that can serve as a reliable, presumptive determiner of whether over-the-air signals of network affiliated television stations can be received at individual household locations. Accordingly, DIRECTV urges the Commission to adopt its proposals, as set forth above.

Respectfully submitted,

DIRECTV, Inc.

By: 

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